Air Resources Board

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Chairman
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Terry Tamminen
Agency Secretary

Arnold Schwarzenegger
Governor

MEMORANDUM

TO: Air Quality Surveillance Branch Staff

FROM: Ken Stroud, Chief
Air Quality Surveillance Branch

DATE: May 28, 2004

SUBJECT: MET ONE BAM-1020 UPDATES AND ALL HANDS CONFERENCE CALL

Since our first evaluation of continuous PM2.5 technologies in the winter of 1998/99, our continuous PM2.5 program has grown in size and prominence. We now have 49 PM2.5 BAMS operating at 44 sites in the state. Last summer, the Air Resources Board (ARB) adopted the Met One PM2.5 1020 Beta Attenuation Monitor as one of three State Reference Methods for continuous PM2.5, allowing for the data we collect to be used for establishing nonattainment areas for the state PM2.5 standard (which is an annual mean of 12 ug/m3). And last October, the U.S.EPA added real-time PM2.5 data to its AIRNow Website, meaning our BAM data became available nationally at the top of every hour.

Our continuous PM2.5 program has now entered a critical stage. We are at the point where each of you involved with the program have to apply all we have learned in the last five years to ensure the BAMs are operated properly, and our data users have a high degree of confidence in the resulting data. To this end, we have undertaken a network-wide hardware/firmware upgrade, made the SOP easily accessible to you on our Web Manual, and completed a detailed assessment of BAM performance for calendar year 2003 for those sites with PM2.5 FRMs.

Please review the contents below that we will discuss during a branch-wide conference call on June 17, 2004. If you operate a BAM, or are involved with the program as a data reviewer, or shop technician you need to be very familiar with the BAM 1020 SOP and manual. If you are not, please take the time to study the material. The BAM program is very important to our branch, if you have questions or are unsure about your responsibilities, please contact the appropriate OSS staff and/or your manager.

HARDWARE AND FIRMWARE UPGRADES

This month we began upgrading all ARB BAM-1020 units with the BX-827 Smart Heater upgrade from Met One. This upgrade replaces the 30W tape heater with a more powerful 200W heater unit that is controlled through a feedback mechanism using internal relative humidity measurements taken after the filter tape. The modification will also upgrade the BAM-1020 firmware to version 2.55. The smart heater should reduce instrument maintenance time by reducing the water vapor on the tape, which can lead to tape material buildup on the nozzle. The BX-827 upgrade will be done on-site to ensure minimal instrument down time. Training on the use of the smart heater will be done during the installations. We expect all ARB-owned BAMs to be upgraded by the end of June.

KEY OPERATIONAL AND DATA VALIDATION CRITERIA

The latest BAM SOP (released June 2003) contains information imperative to the operation of the BAM. Deviations from the procedures contained within the SOP may result in invalid data. The SOP requires two (2) flow and leak checks a month. Flow checks should be 16.7 LPM ± 4% (16.00 LPM – 17.34 LPM) and leak checks should be less than 1.0 LPM. The nozzle and vane should be inspected for tape buildup and cleaned during every tape replacement. The used tape should be inspected for pinholes and irregular PM deposition after tape changes as well.

Since the BAM cannot be challenged directly, we have only operating parameters with which to validate the data. Information on data validation covered in the latest BAM SOP (released June 2003) are essential for ensuring accurate and valid data from the BAM-1020. Downloading the data from the internal BAM datalogger is critical for data validation. The Q_{tot} value and error codes are important values for assessing the operation of the BAM during sampling and are only available from the internal datalogger. Differences between the internal datalogger and the external DAS should also be checked and kept to within 1 ug/m3. If flow and leak checks are outside acceptable limits, data must be invalidated back to the last valid leak and flow check. Details on the importance of data validation can be found in the latest BAM SOP, Section 12.0, which is available on the AQSB Web Manual at http://www.arb.ca.gov/aqdas/amwm.php. Using these, parameters, BAM data should be fully reviewed and submitted within 15 days of the end of each month.

YOUR BAM DATA AVAILABLE NATIONALLY AT THE TOP OF EVERY HOUR

Data generated by the BAM-1020 is being reported to both Air Quality System (AQS), formerly known as AIRS (data-for-record), and the United States Environmental Protection Agency (U.S. EPA) AIRNow Program (realtime-data). The AIRNow website delivers current and forecasted AQI values for both ozone and PM2.5 to the public. The website can be accessed at http://www.epa.gov/airnow/. The PM2.5 AQI values are generated using your hourly BAM data and appear in local newspapers and newcasts. Proper maintenance and QC checks are necessary to ensure that the real-time data reported to AIRNow is as accurate as possible.

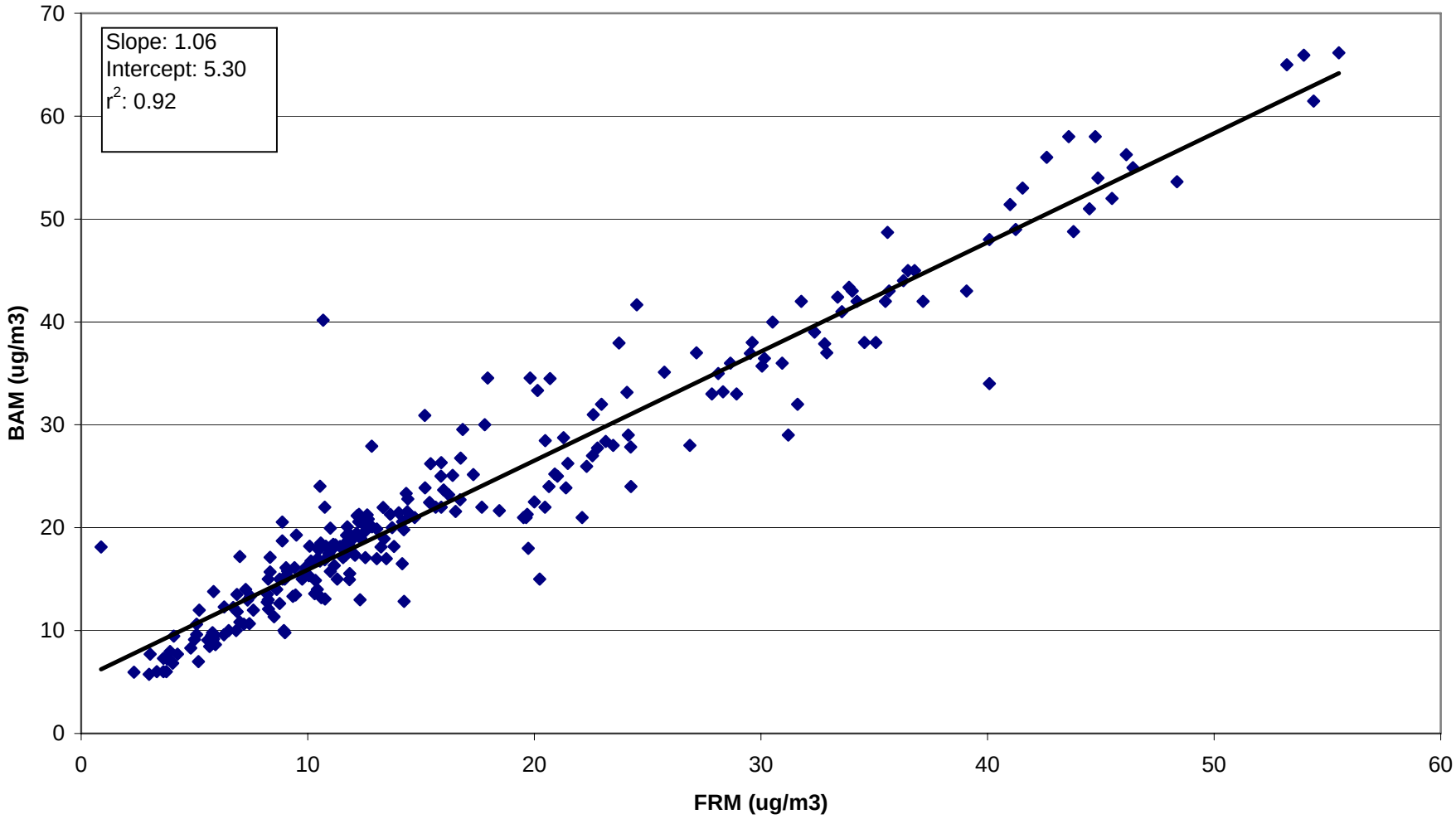
2003 BAM PERFORMANCE

Attached to this memo are regressions of 2003 BAM data at ARB monitoring sites with both a BAM-1020 and a PM2.5 FRM sampler. Many of our sites have excellent correlation with the PM2.5 FRM samplers. Three BAM's have r^2 values of over 0.9 (an r^2 of 1.0 is perfect), and the lowest site is 0.79. Our goal should be to get all BAM's operating at the same high level. If the maintenance checks and data validations described in the BAM SOP are followed, we should be able to raise the correlation with the PM2.5 FRM samplers at all sites. We will have a conference call on June 17, 2004 to review these regression charts, discuss the smart heaters and other BAM issues, and review maintenance and validation procedures. Please contact Mac McDougal at 916-327-4720 or via e-mail at emcdouga@arb.ca.gov or Matt Quok at 916-445-2555 or via e-mail at mquok@arb.ca.gov, with any questions.

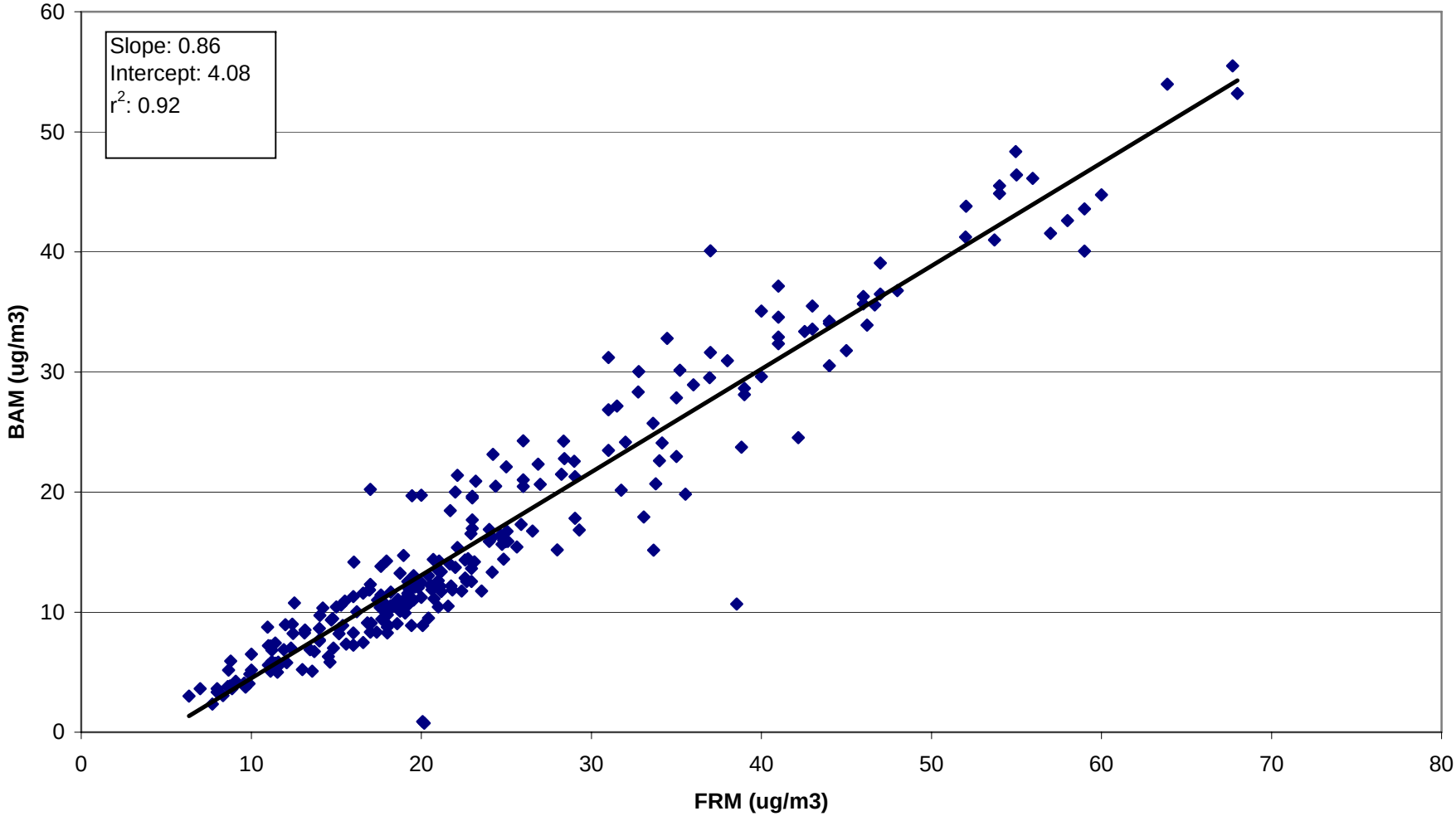
Attachment

cc: William Loscutoff
Jeff Cook
Mac McDougall
Matt Quok

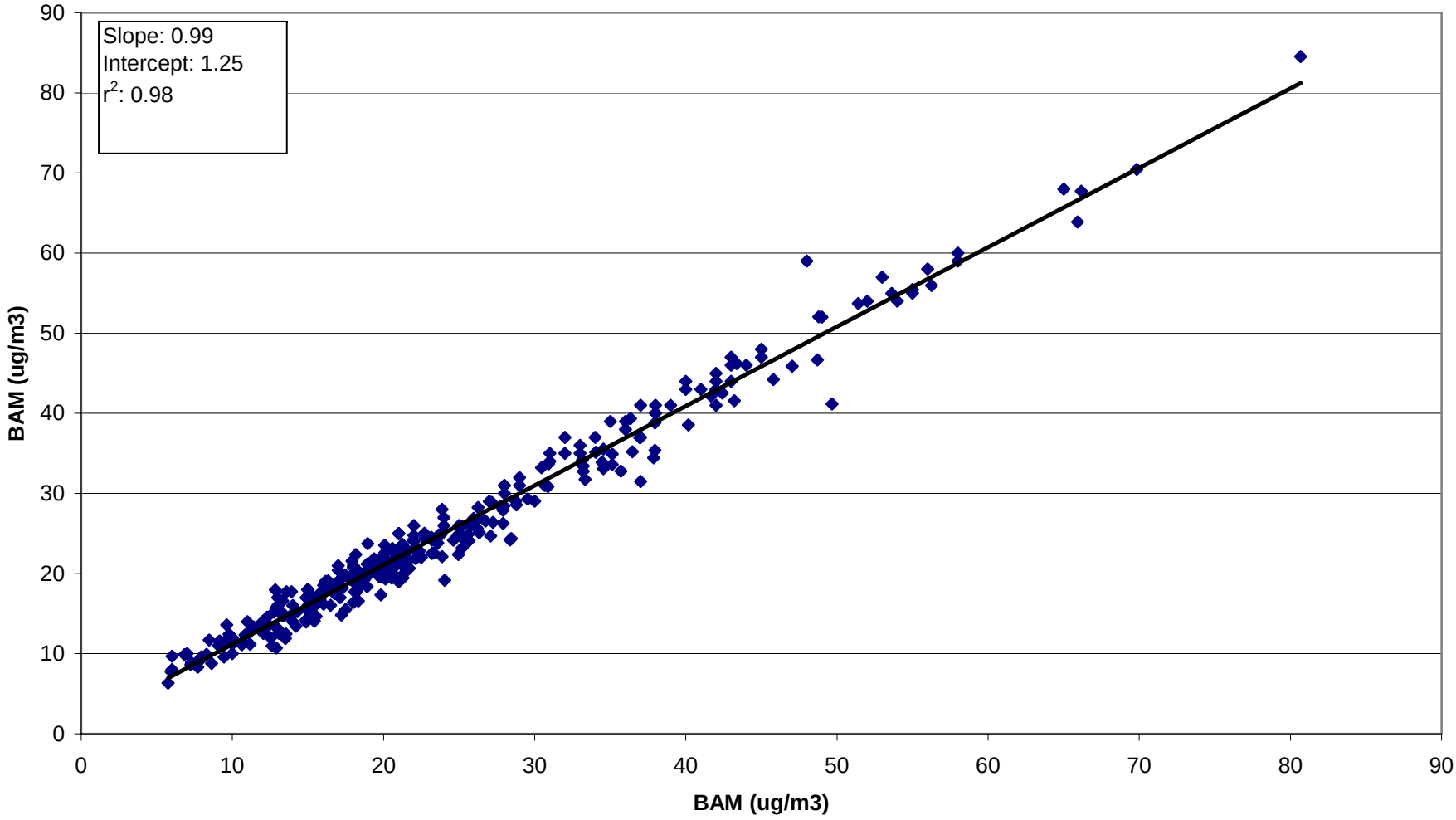
Bakersfield - California Ave.
Primary Met One BAM (Model 1020) vs. PM2.5 FRM
January 2003 - December 2003



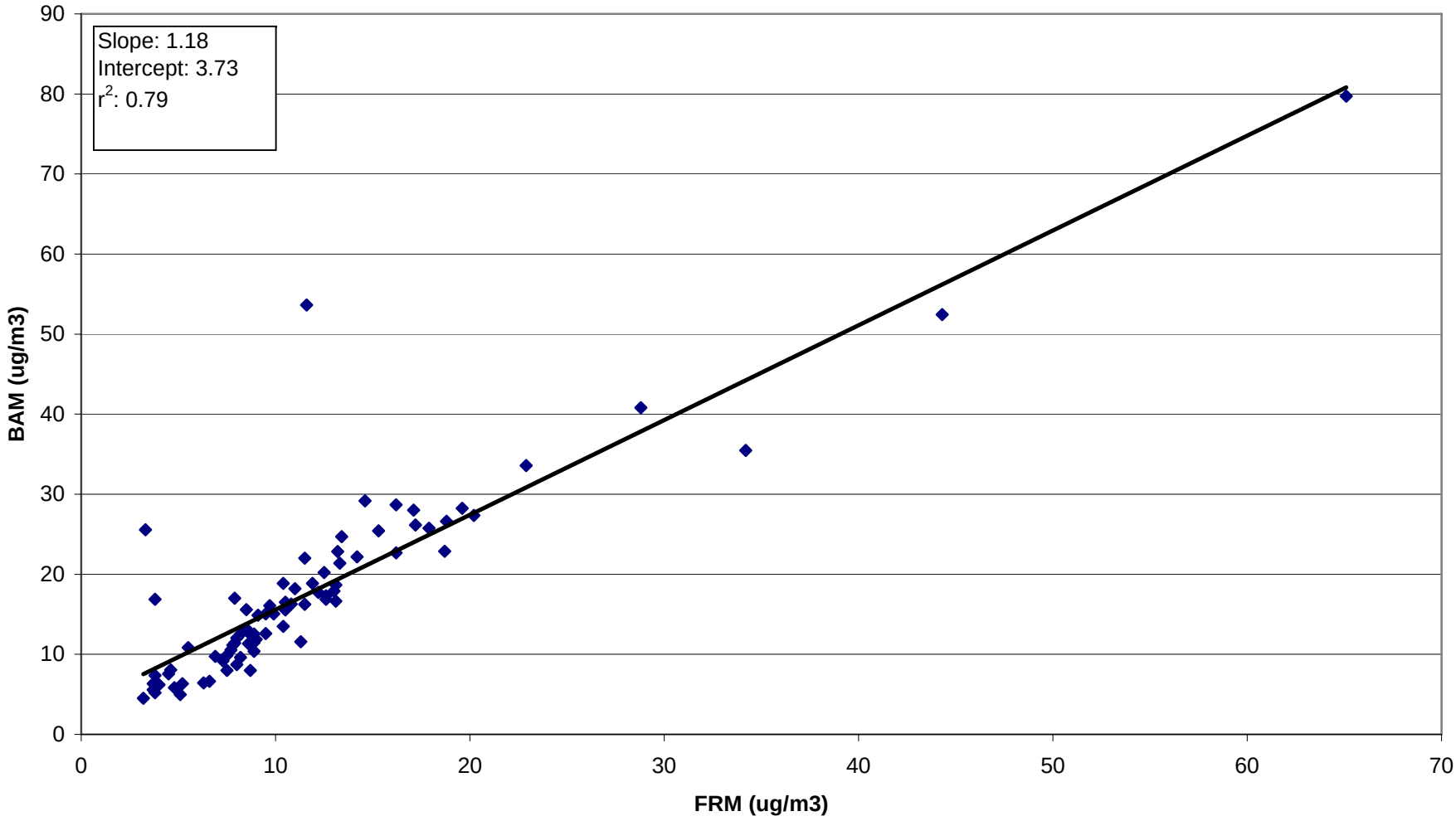
Bakersfield - California Ave.
Collocated Met One BAM (Model 1020) vs. PM2.5 FRM
January 2003 - December 2003



Bakersfield - California Ave.
Primary Met One BAM (Model 1020) vs. Collocated Met One BAM (Model 1020)
January 2003 - December 2003



Calexico - Ethel St.
Primary Met One BAM (Model 1020) vs. PM2.5 FRM
January 2003 - December 2003



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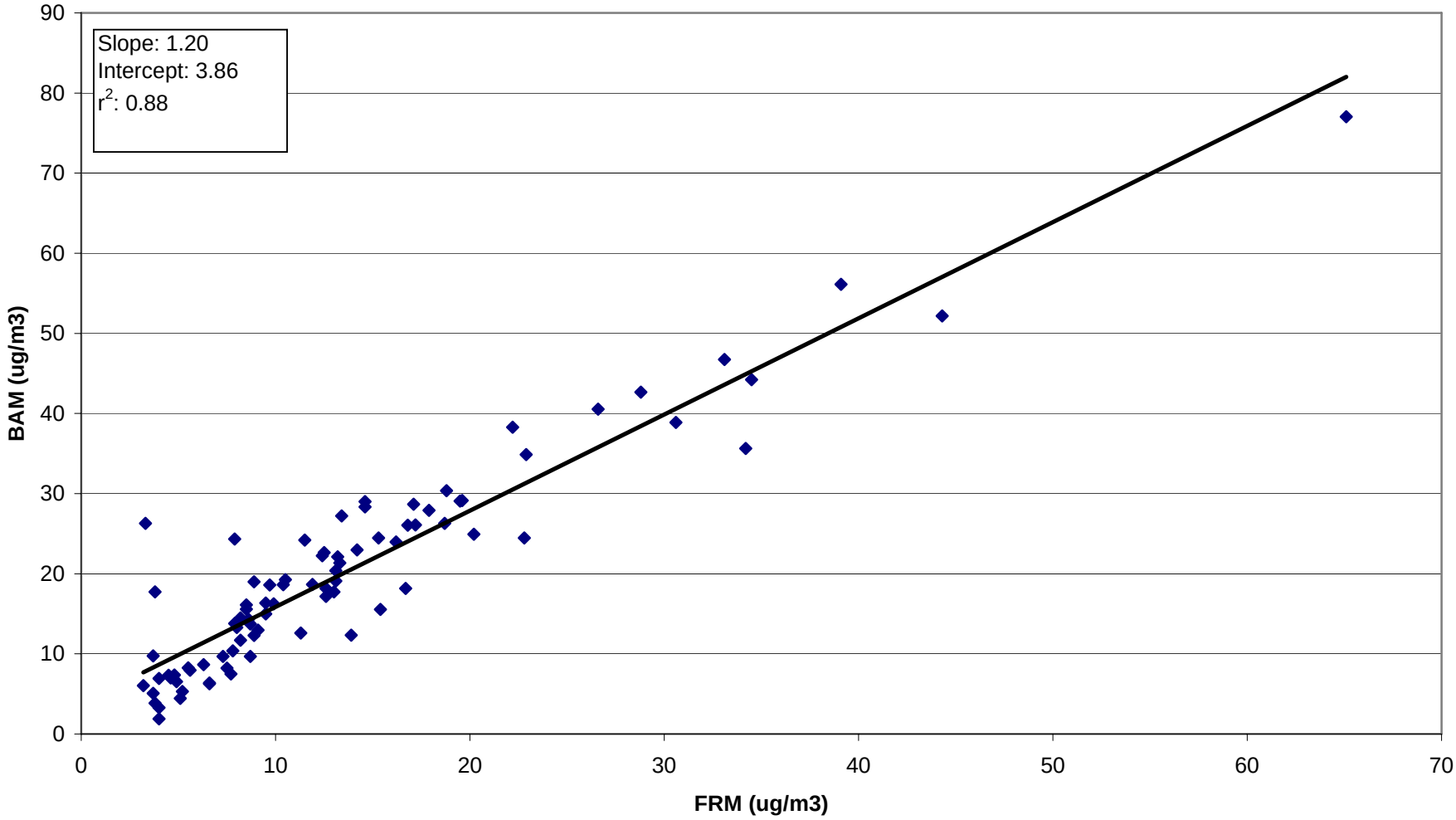

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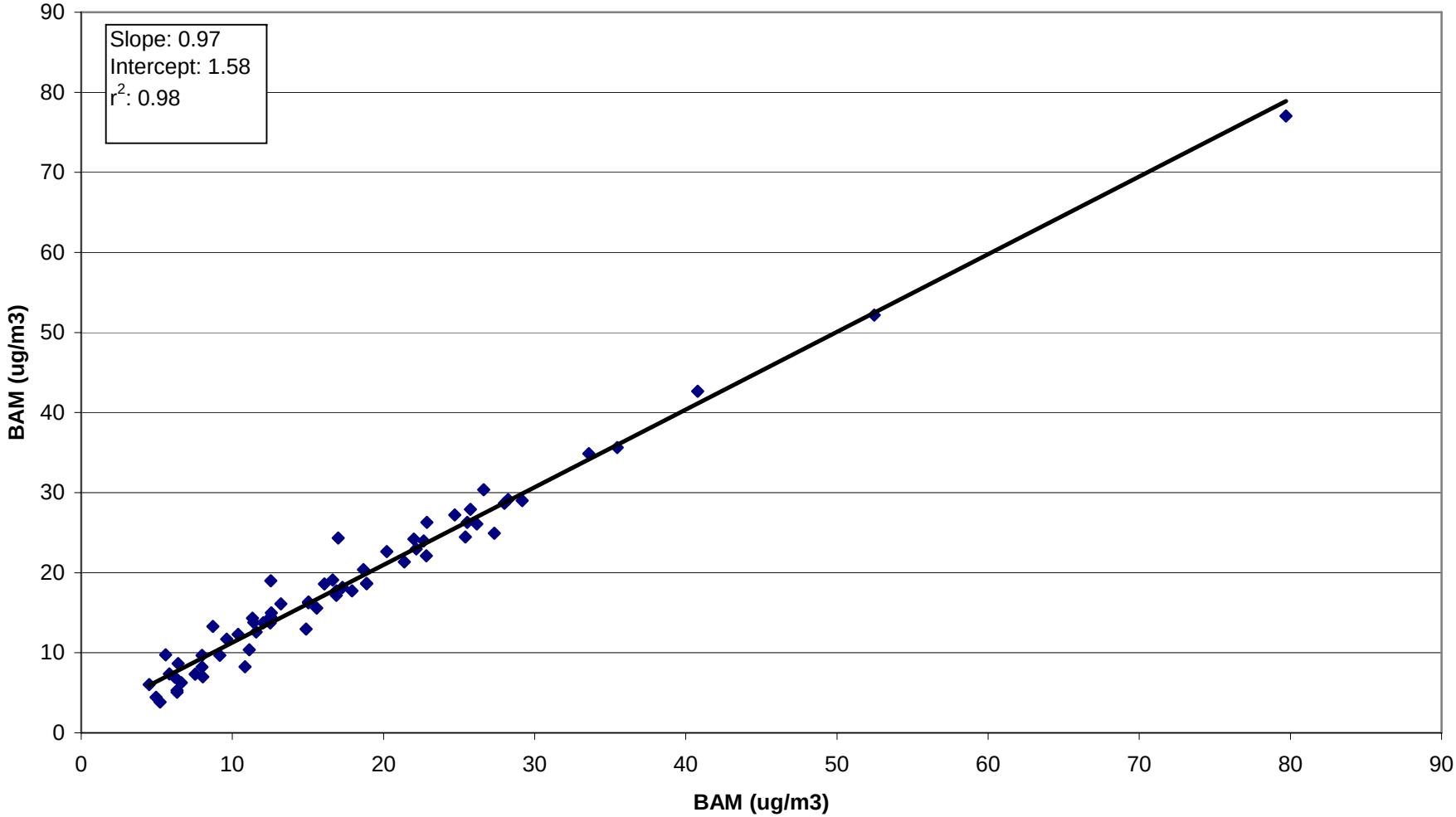
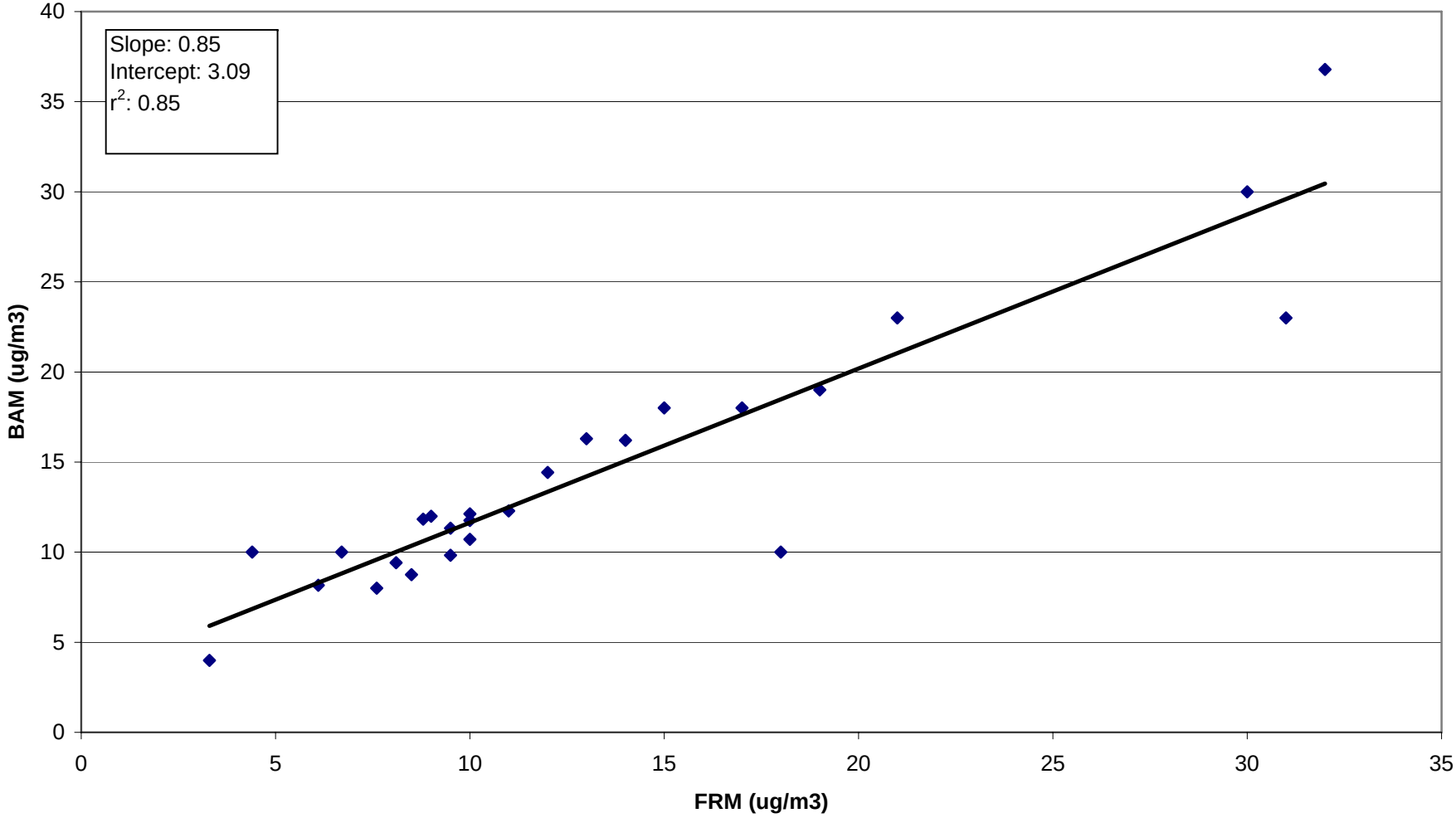


Chico - Manzanita Ave.
Primary Met One BAM (Model 1020) vs. PM2.5 FRM
January 2003 - December 2003



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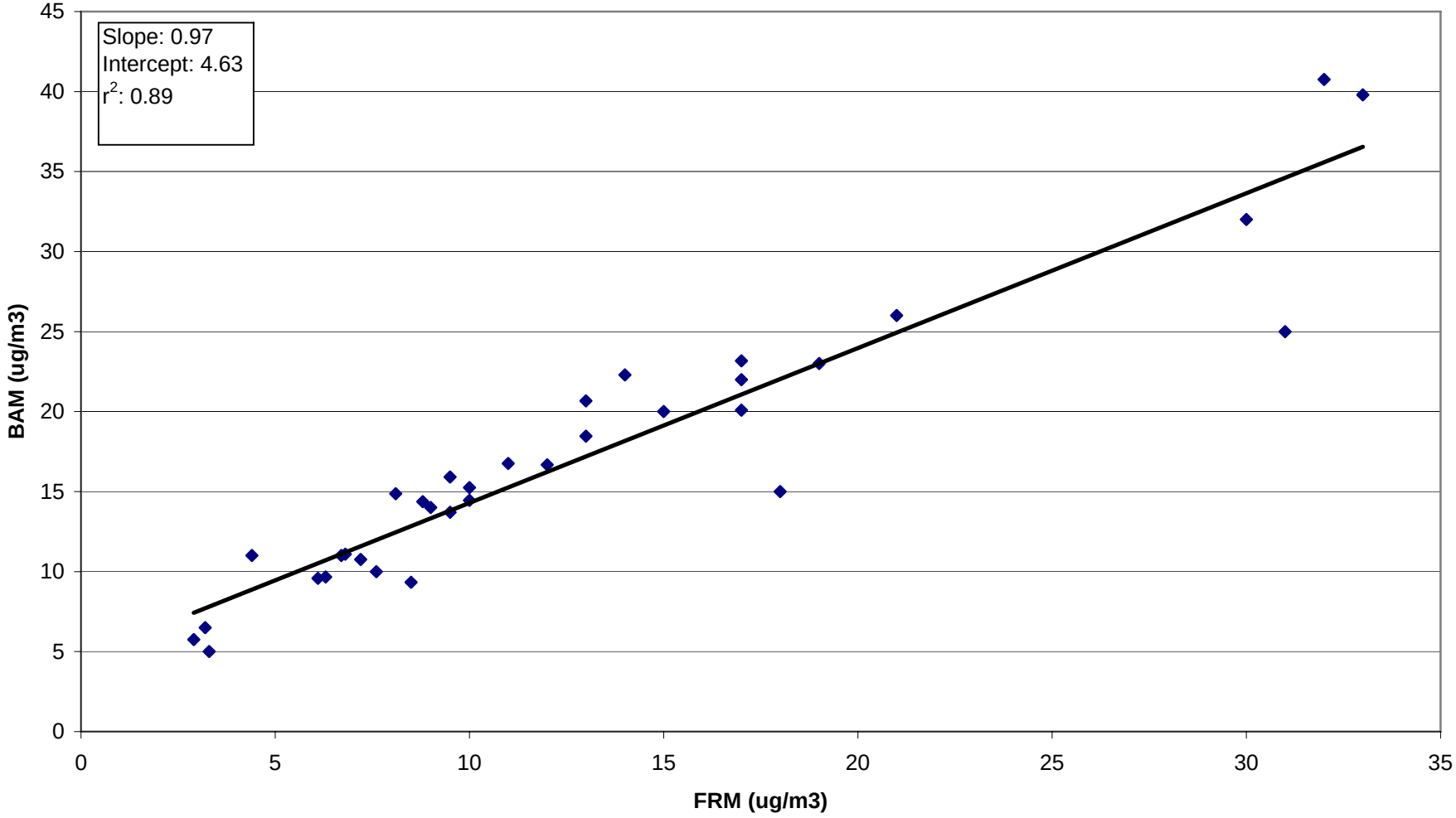

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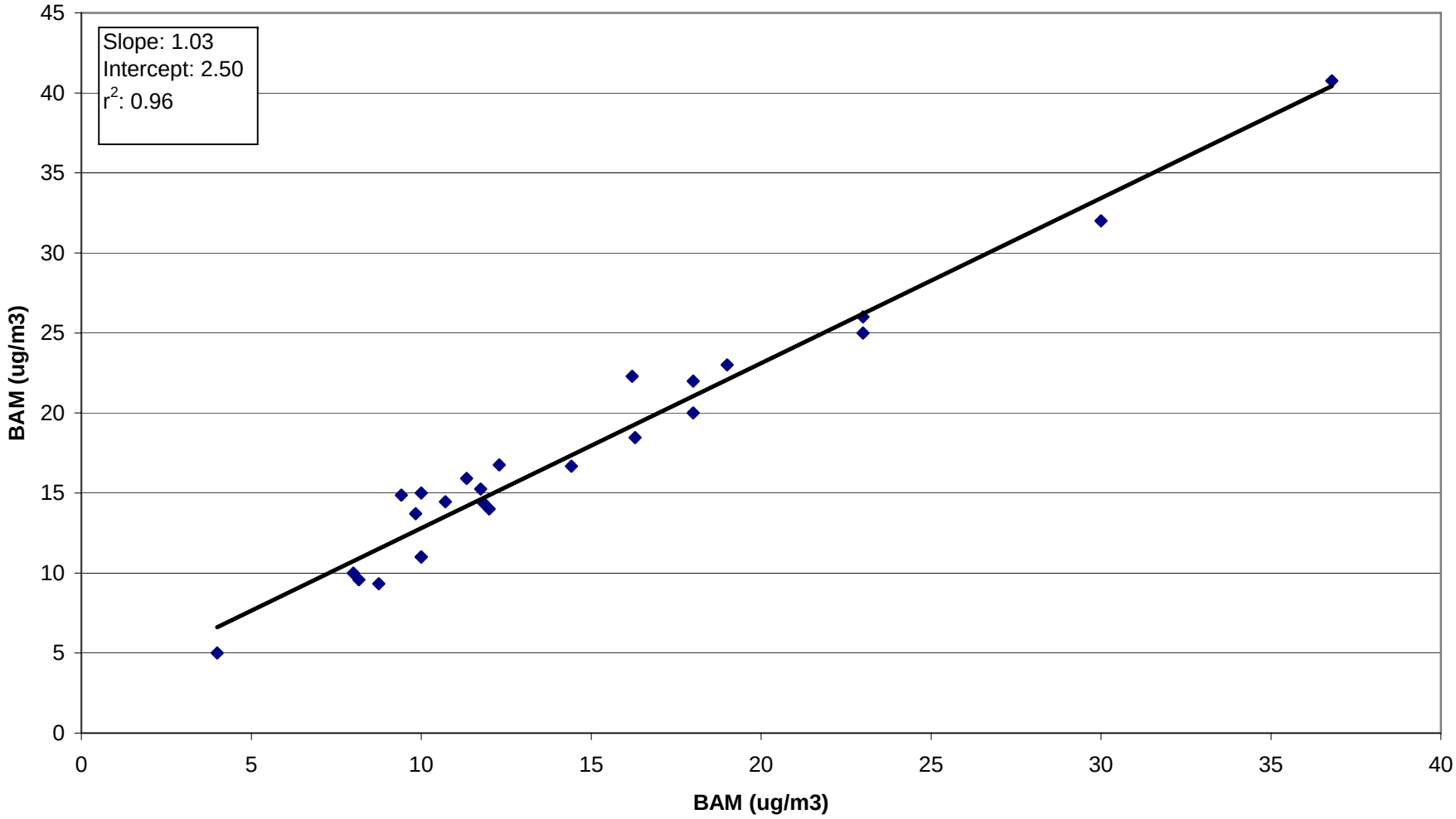
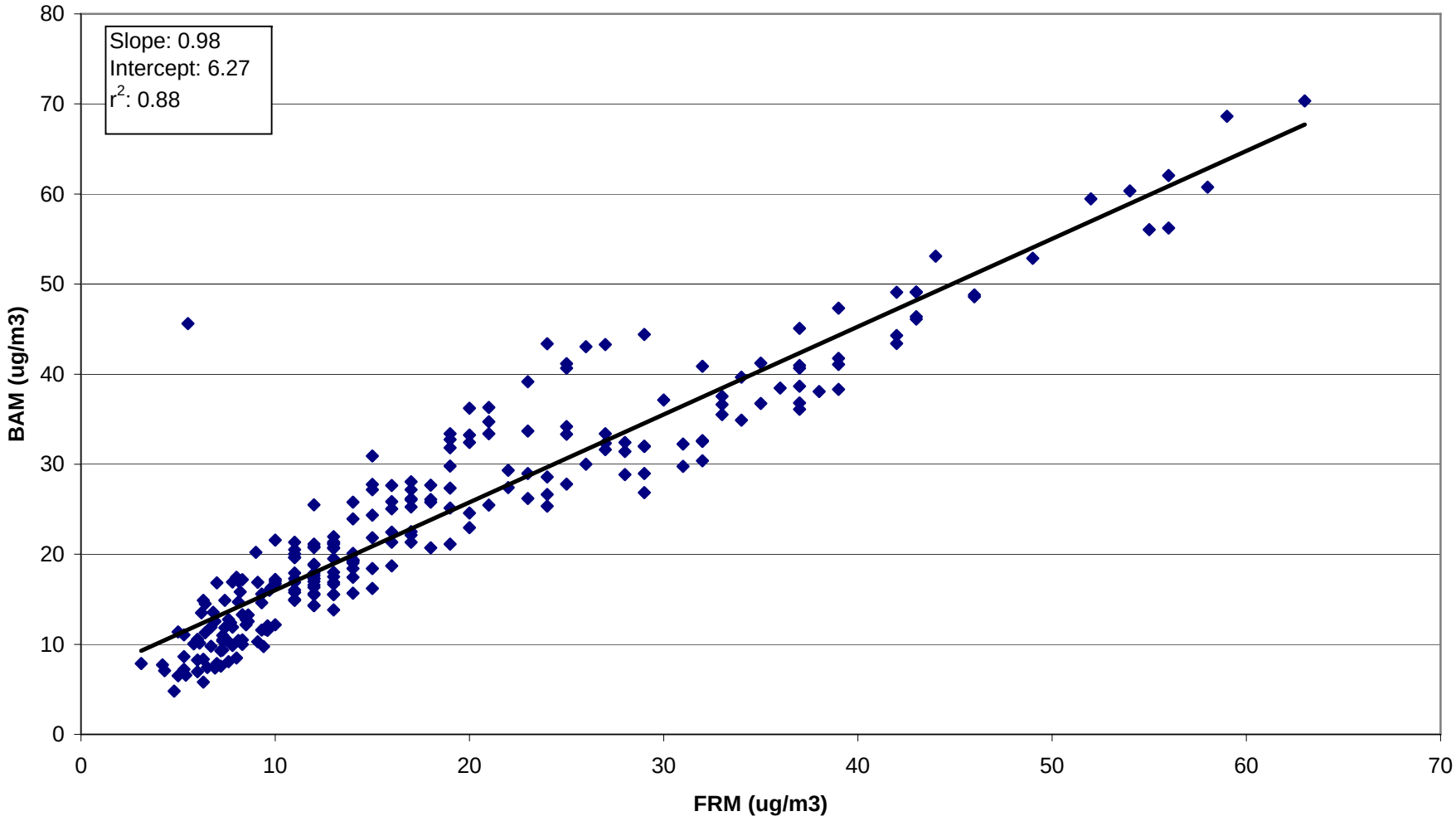
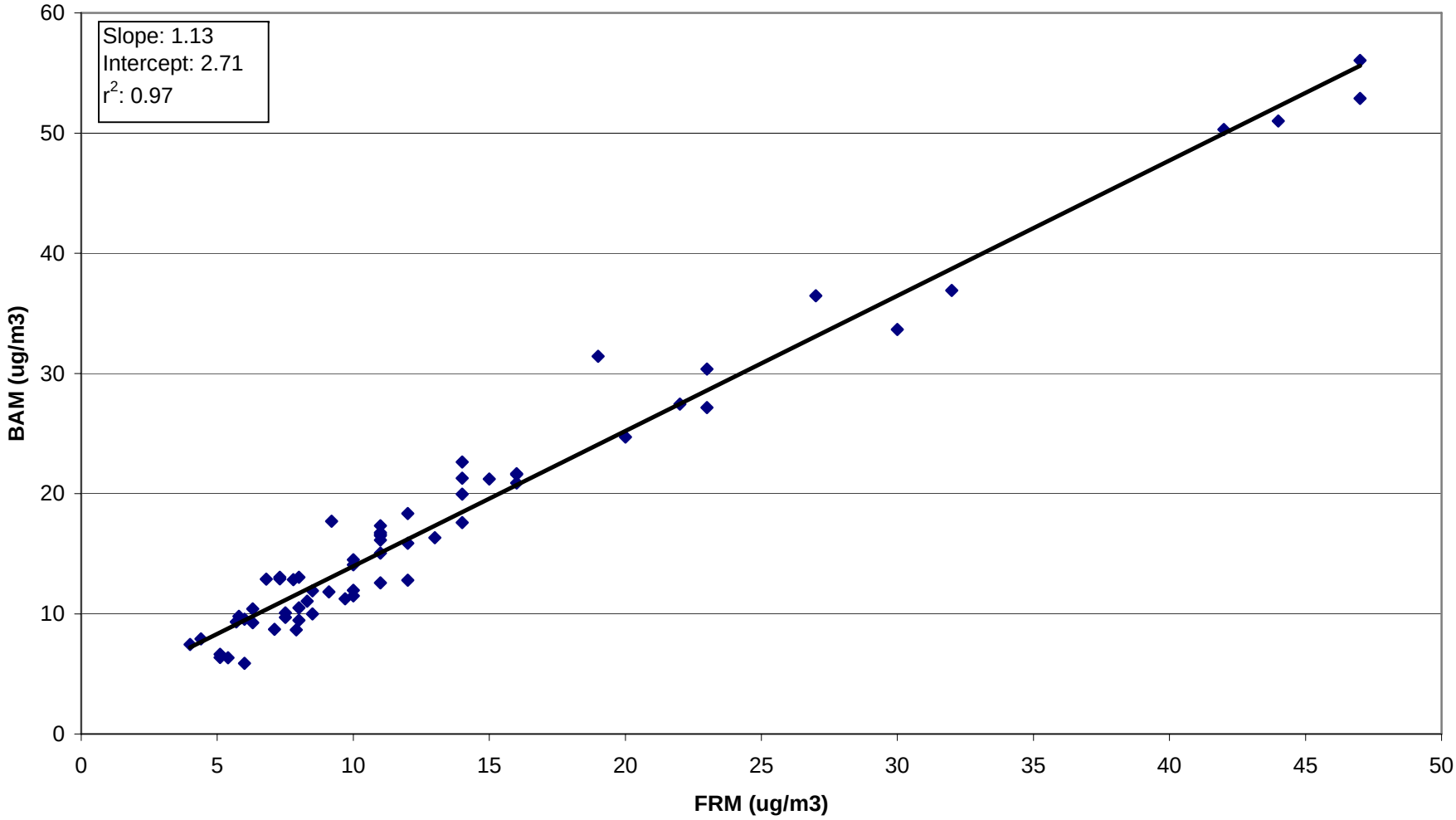


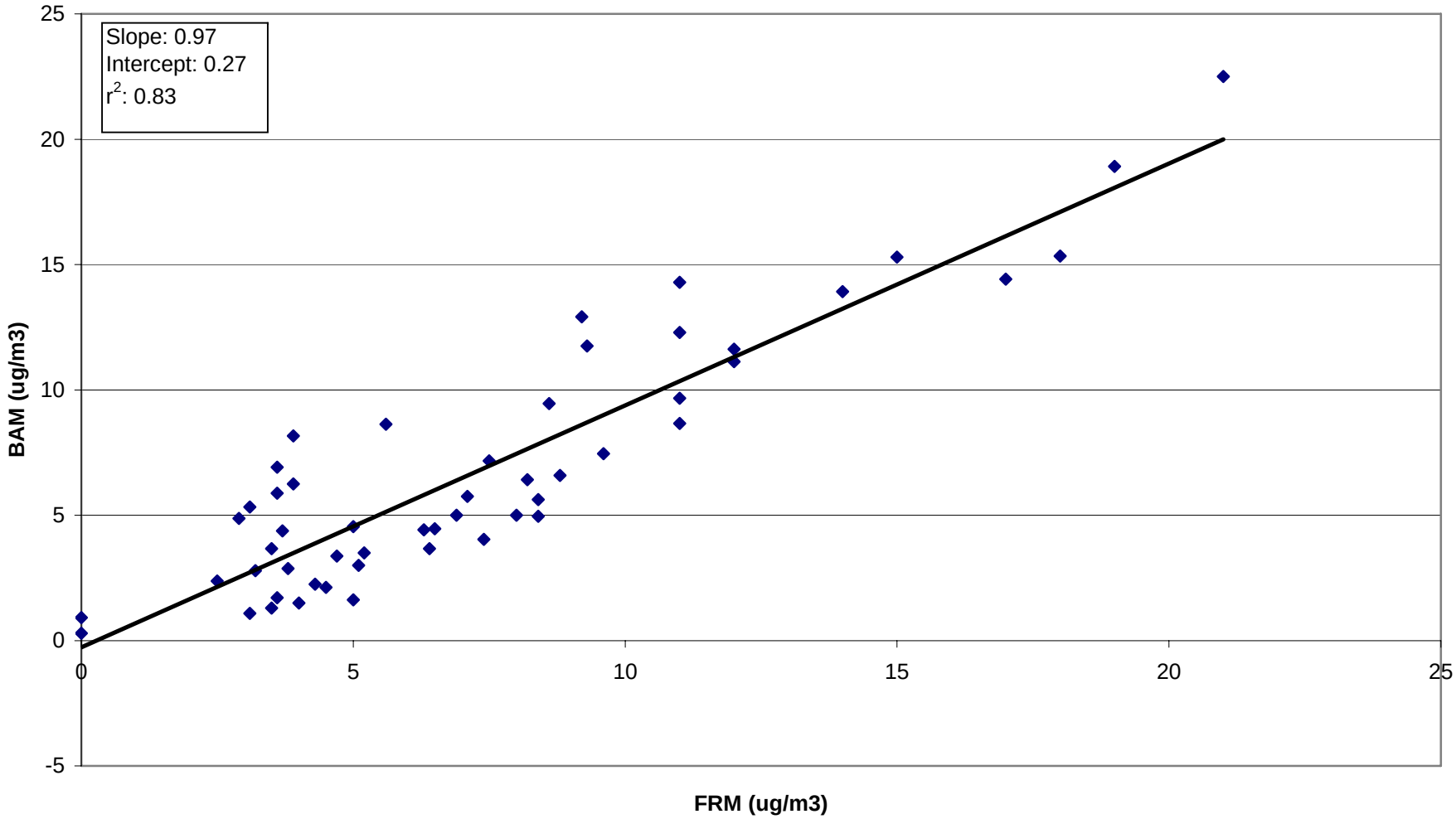
Fresno - First St.
Met One BAM (Model 1020) vs. PM2.5 FRM
January 2003 - December 2003



Modesto - 14th Street
Met One BAM (Model 1020) vs. PM2.5 FRM
January 2003 - December 2003



South Lake Tahoe - Sandy Way
Met One BAM (Model 1020) vs. PM2.5 FRM
January 2003 - December 2003



Visalia - N. Church St.
Met One BAM (Model 1020) vs. PM2.5 FRM
January 2003 - December 2003